CLAIMS

WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device, the method comprising the steps of:

forming a stress relief layer on a wafer such that the stress relief layer is away from at least part of electrodes formed on the wafer;

forming a wiring layer in which lines that extend from the electrodes to the stress relief layer are formed;

forming outer electrodes that are over the stress relief layer and are connected to the lines in the wiring layer; and

forming a dielectric layer by applying dielectric liquid by an inkjet method to portions in the lines where the outer electrodes are connected to form a capacitor, after the step of forming the wiring layer.

2. A method for manufacturing a semiconductor device according to Claim 1, the method further comprising the steps of:

forming a protective film on the wiring layer, after the step of forming the wiring layer; and

forming an opening in at least part of the protective film, corresponding to the outer electrodes, before the step of forming the outer electrodes,

wherein applying the dielectric liquid by the inkjet method to the opening forms the dielectric layer in the step of forming the dielectric layer.

3. A method for manufacturing a semiconductor device according to Claim

1, the method further comprising the step of sintering the dielectric layer after the step of forming the dielectric layer.

4. A method for manufacturing a semiconductor device according to Claim 1, the method further comprising the steps of:

sintering the dielectric layer; and

forming a conductive layer by applying conductive liquid by the inkjet method to the sintered dielectric layer, the steps being conducted after the step of forming the dielectric layer.

5. A method for manufacturing a semiconductor device according to Claim 1, wherein, in the step of forming the dielectric layer, controlling the number of times the dielectric liquid is discharged with a discharge head for applying the dielectric liquid by the inkjet method to control the thickness of the dielectric layer forms a capacitor having a desired capacitance.

6. A method for manufacturing a semiconductor device according to Claim 1, the method further comprising the step of forming multiple wiring layers in which stress relief layers and wiring layers are alternately deposited, adjacent wiring layers are electrically connected to each other, and the lines on the top wiring layer are connected to the outer electrodes, the step being conducted after the step of forming the wiring layer,

wherein, in the step of forming the multiple wiring layers, forming the dielectric layer between the wiring layers at portions where the adjacent wiring layers are electrically connected to each other or between the top wiring layer and

the outer electrodes in the multiple wiring layers forms the capacitor.

7. A method for manufacturing a semiconductor device, the method comprising the steps of:

forming a stress relief layer on a wafer such that the stress relief layer is away from at least part of electrodes formed on the wafer;

forming a wiring layer in which lines that extend from the electrodes to the stress relief layer are formed;

forming outer electrodes that are over the stress relief layer and are connected to the lines in the wiring layer; and

forming on the stress relief layer an inductor that is electrically connected to the lines by applying conductive liquid in a spiral pattern by an inkjet method, after the step of forming the wiring layer.

8. A method for manufacturing a semiconductor device according to Claim 7, the method further comprising the steps of:

forming a protective film on the wiring layer, after the step of forming the wiring layer; and

forming a spiral open pattern corresponding to the inductor on the protective film, before the step of forming the inductor,

wherein applying the conductive liquid by the inkjet method to the open pattern forms the inductor in the step of forming the inductor.

9. A method for manufacturing a semiconductor device according to Claim 7, further comprising the step of roughening the surface of the stress relief layer in

a spiral pattern before the step of forming the inductor,

wherein, in the step of forming the inductor, applying the conductive liquid by the inkjet method to the spiral pattern where the surface of the stress relief layer is roughened forms the inductor.

10. A method for manufacturing a semiconductor device according to Claim 9, wherein the step of roughening the surface of the stress relief layer is conducted by laser abrasion or sandblasting.

11. A method for manufacturing a semiconductor device according to Claim 7, wherein, in the step of forming the inductor, controlling the number of times the conductive liquid is discharged with a discharge head for applying the conductive liquid by the inkjet method to control the thickness of the conductive layer forms the inductor having a desired resistance.

12. A method for manufacturing a semiconductor device according to Claim 7, wherein, in the step of forming the inductor, controlling the operation of a discharge head for applying the conductive liquid by the inkjet method to control the number of turns in the spiral pattern forms the inductor having a desired inductance.

13. A method for manufacturing a semiconductor device according to Claim 7, the method further comprising the step of forming multiple wiring layers in which stress relief layers and wiring layers are alternately deposited, adjacent wiring layers are electrically connected to each other, and the lines on the top wiring

layer are connected to the outer electrodes, the step being conducted after the step of forming the wiring layer,

wherein, in the step of forming the multiple wiring layers, applying the conductive liquid in the spiral pattern by the inkjet method forms at least one wiring layer in the multiple wiring layers to form the inductor.

14. A method for manufacturing a semiconductor device, the method comprising the steps of:

forming a stress relief layer on a wafer such that the stress relief layer is away from at least part of electrodes formed on the wafer;

forming a wiring layer in which lines that extend from the electrodes to the stress relief layer are formed;

forming outer electrodes that are over the stress relief layer and are connected to the lines in the wiring layer; and

forming multiple wiring layers in which stress relief layers and wiring layers are alternately deposited, adjacent wiring layers are electrically connected to each other, and the lines on the top wiring layer are connected to the outer electrodes, the step being conducted after the step of forming the wiring layer,

wherein the step of forming the multiple wiring layers includes the step of forming a filter having at least one capacitor that has a dielectric layer between the wiring layers at the portions where the adjacent wiring layers are electrically connected to each other or between the top wiring layer and the outer electrodes and at least one inductor that is at least one wiring layer formed in a spiral pattern in the multiple wiring layers, and

wherein, in the step of forming the filter, applying dielectric liquid by an

inkjet method forms the dielectric layer and applying conductive liquid in the spiral pattern by the inkjet method forms the inductor.

15. A method for manufacturing a semiconductor device, the method comprising the steps of:

forming a stress relief layer on a wafer such that the stress relief layer is away from at least part of electrodes formed on the wafer;

forming a wiring layer in which lines that extend from the electrodes to the stress relief layer are formed;

forming outer electrodes that are over the stress relief layer and are connected to the lines in the wiring layer; and

forming multiple wiring layers in which stress relief layers and wiring layers are alternately deposited, adjacent wiring layers are electrically connected to each other, and the lines on the top wiring layer are connected to the outer electrodes, the step being conducted after the step of forming the wiring layer,

wherein, in the step of forming the multiple wiring layers, the wiring layer on one face of the top stress relief layer is formed to be a ground plane such that lines having a microstrip line structure are formed in the wiring layer on the other face of the top stress relief layer, and

wherein the step of forming the multiple wiring layers includes the step of forming a plurality of strip lines that are electromagnetically coupled to each other and are spaced at predetermined intervals by applying conductive liquid by an inkjet method to the lines having the microstrip line structure to form a bandpass filter.

16. A semiconductor device manufactured by the methods according to Claim 1.